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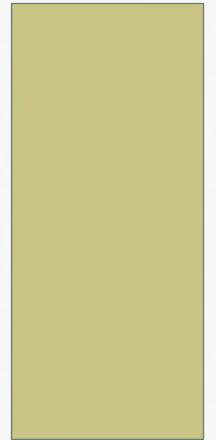
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ASSOCIATIVE LEARNING AND CATEGORIZATION: IN SEARCH OF SYSTEM 1

ANDY J. WILLS – PLYMOUTH UNIVERSITY, U.K.



SYSTEM 1, SYSTEM 2

System 1	System 2
Associative Holistic Automatic Light on cognitive resources Fast	Rule-based Analytic Controlled Heavy on cognitive resources Slow

- Stanovich & West (2000), generalizing over many authors.
 - Posner & Snyder (1975), Shiffrin & Schneider (1977), Johnson-Laird (1983), Evans (1984), Reber (1993), Sloman (1996)
- In theories of categorization, the view is also common:
 - Brooks (1978), Ashby et al. (1998).

1. FREE CLASSIFICATION

System 1	System 2
Associative Holistic Automatic Light on cognitive resources Fast	Rule-based Analytic Controlled Heavy on cognitive resources Slow

Less is more hypothesis.

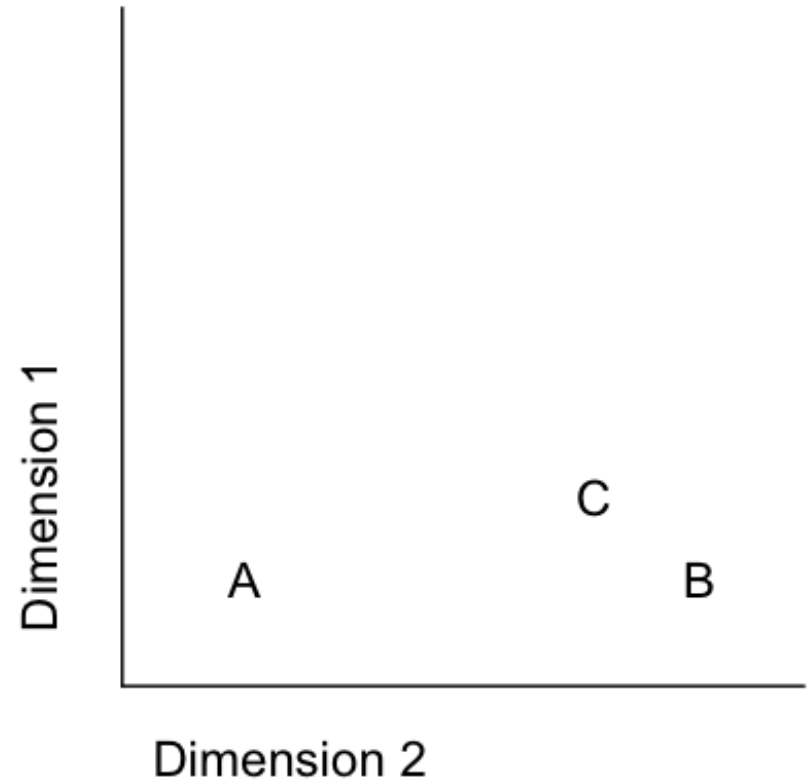
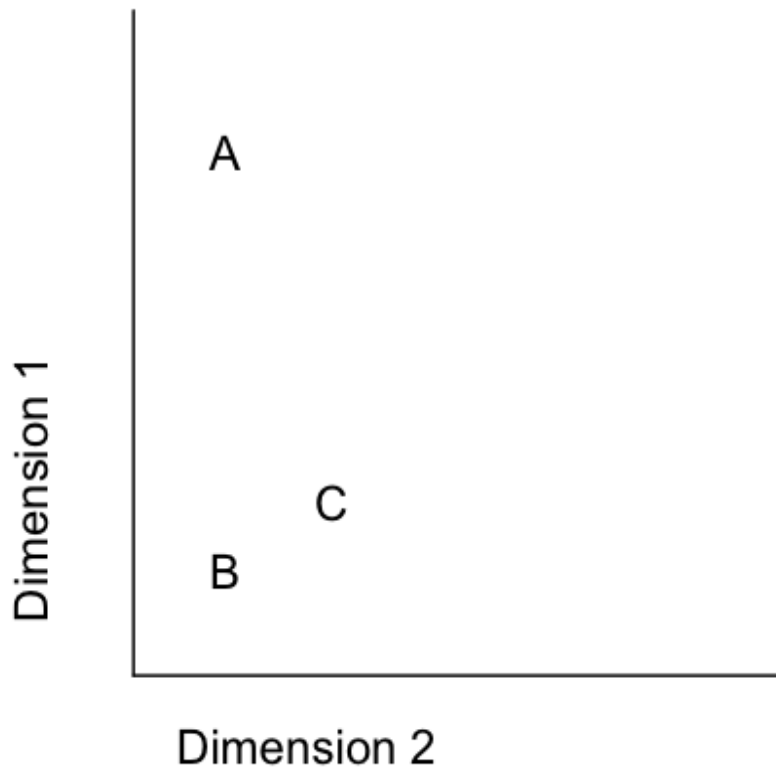
“Evidence suggests that in many situations, it is easier for people to base similarity and categorization judgments on more, rather than fewer, properties”

Goldstone & Barsalou (1998, p.239)

“[overall similarity] categorization is the default mode of approach to tasks when full executive functioning is underdeveloped, inhibited, or lacking for any reason”

Couchman et al. (2010, p.180).

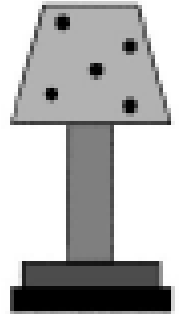
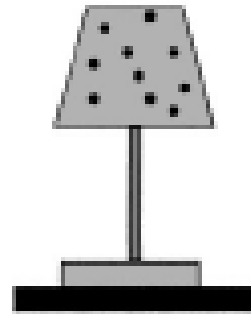
1A. TRIAD TASK



- Smith and Kemler Nelson (1984)

1B. MATCH TO STANDARDS

- Sort each of 10 items into one of two categories, represented by the two “standards”.
- No feedback.
- 90%+ of people produce either an overall similarity classification or a single-dimension classification.



1B. MATCH TO STANDARDS

- OS prevalence **reduced** by:
 - Time pressure (Milton, Longmore & Wills, 2008)
 - Concurrent load (Wills et al., in press)
- Those producing OS classifications have:
 - More frontal lobe activity (Milton, Wills & Hodgson, 2009)
 - Larger working memory capacities, as measured by OSPAN (Wills et al., in press).

1. FREE CLASSIFICATION

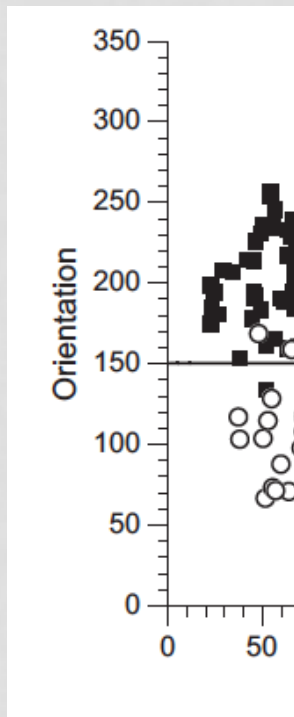
System 1	System 2
Associative Holistic Automatic Light on cognitive resources Fast	Rule-based less ← analytic → more Controlled less ← cognitive resources → more Slow

2. CATEGORIZATION WITH FEEDBACK

- **C**ompetition between **V**erbal and **I**mplicit **S**ystems (**COVIS**) model (Ashby et al. 1998)

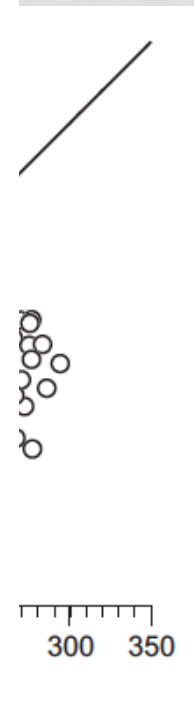
System 1	System 2
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2. CATEGORIZATION WITH FEEDBACK



Click to **LOOK INSIDE!**

The image shows the front cover of the book 'Blind' by Malcolm Gladwell. The title 'Blind' is written vertically in large, blue, hand-drawn letters on the left side. The author's name 'MALCOLM GLADWELL' is printed in black at the top right. Below the author's name is a black office chair with a white tag on the backrest that says 'LOOK INSIDE!'. At the bottom right, the text 'THE POWER OF THINKING WITHOUT THINKING' is printed in black. At the very bottom, it says 'THE No. 1 INTERNATIONAL BESTSELLER' next to the Penguin logo. An orange arrow points from the 'LOOK INSIDE!' text to the chair.



2A. FILOTEO ET AL. (2010)

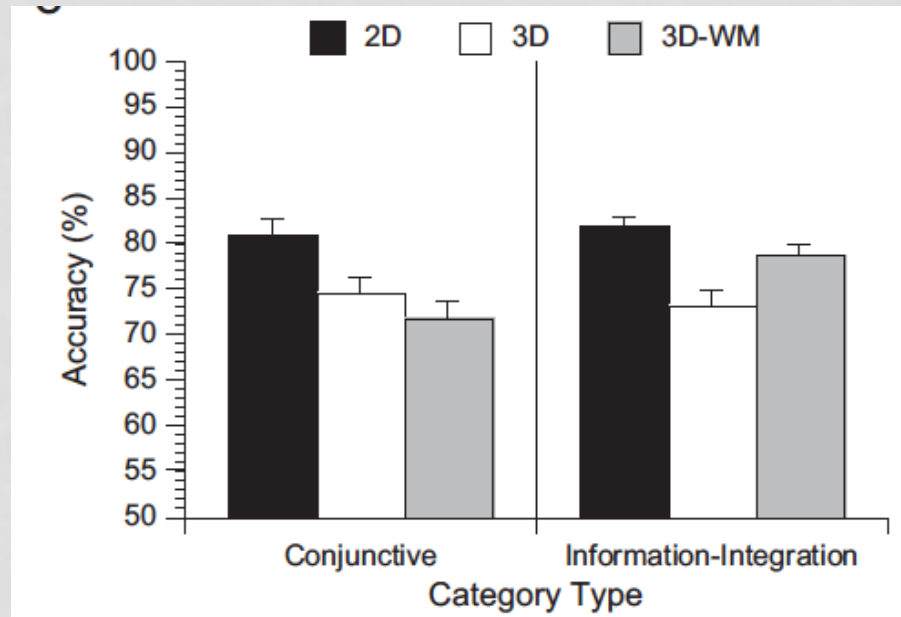
Research Article



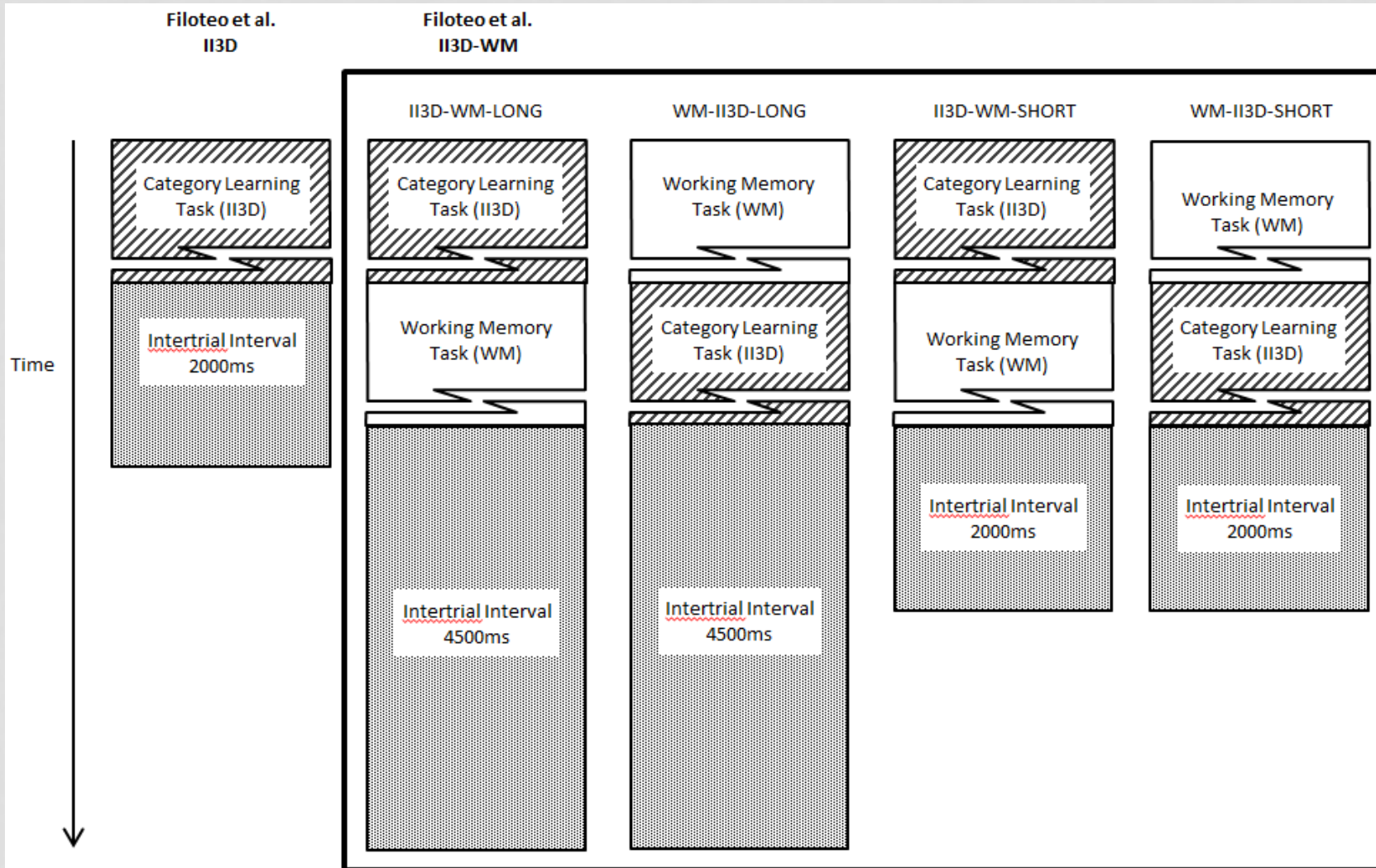
Removing the Frontal Lobes: The Effects of Engaging Executive Functions on Perceptual Category Learning

Psychological Science
21(3) 415–423
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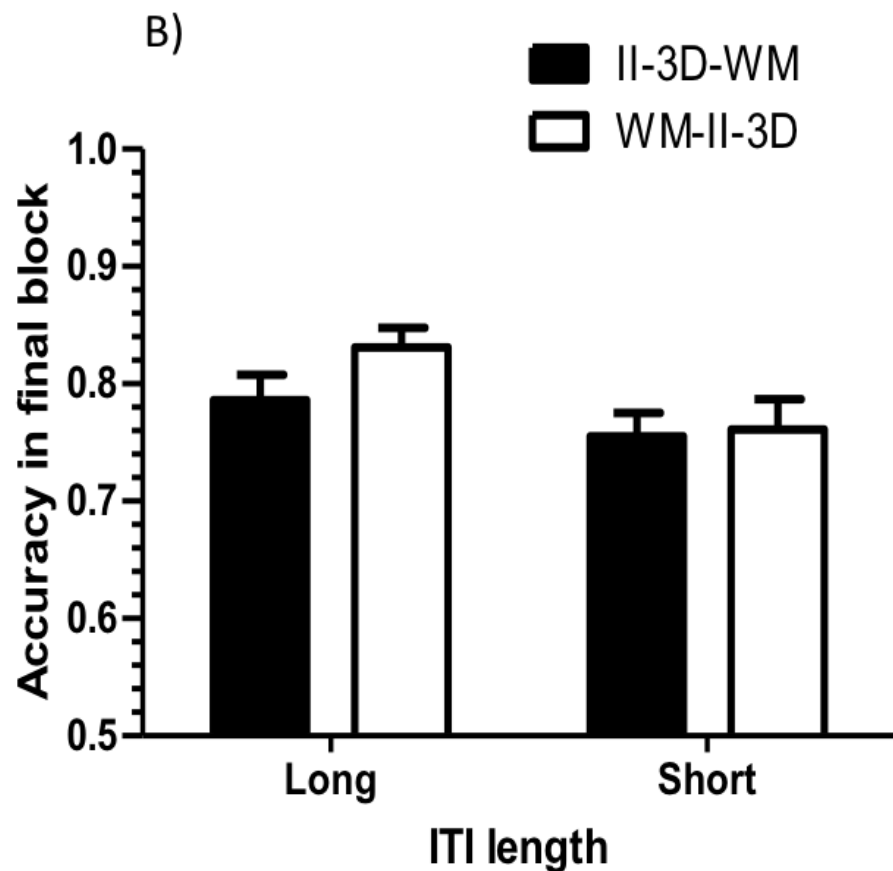
J. Vincent Filoteo^{1,2}, Scott Lauritzen³, and W. Todd Maddox^{3,4}



2B. NEWELL, MOORE, WILLS & MILTON (IN PRESS)



2B. NEWELL, MOORE, WILLS & MILTON (IN PRESS)



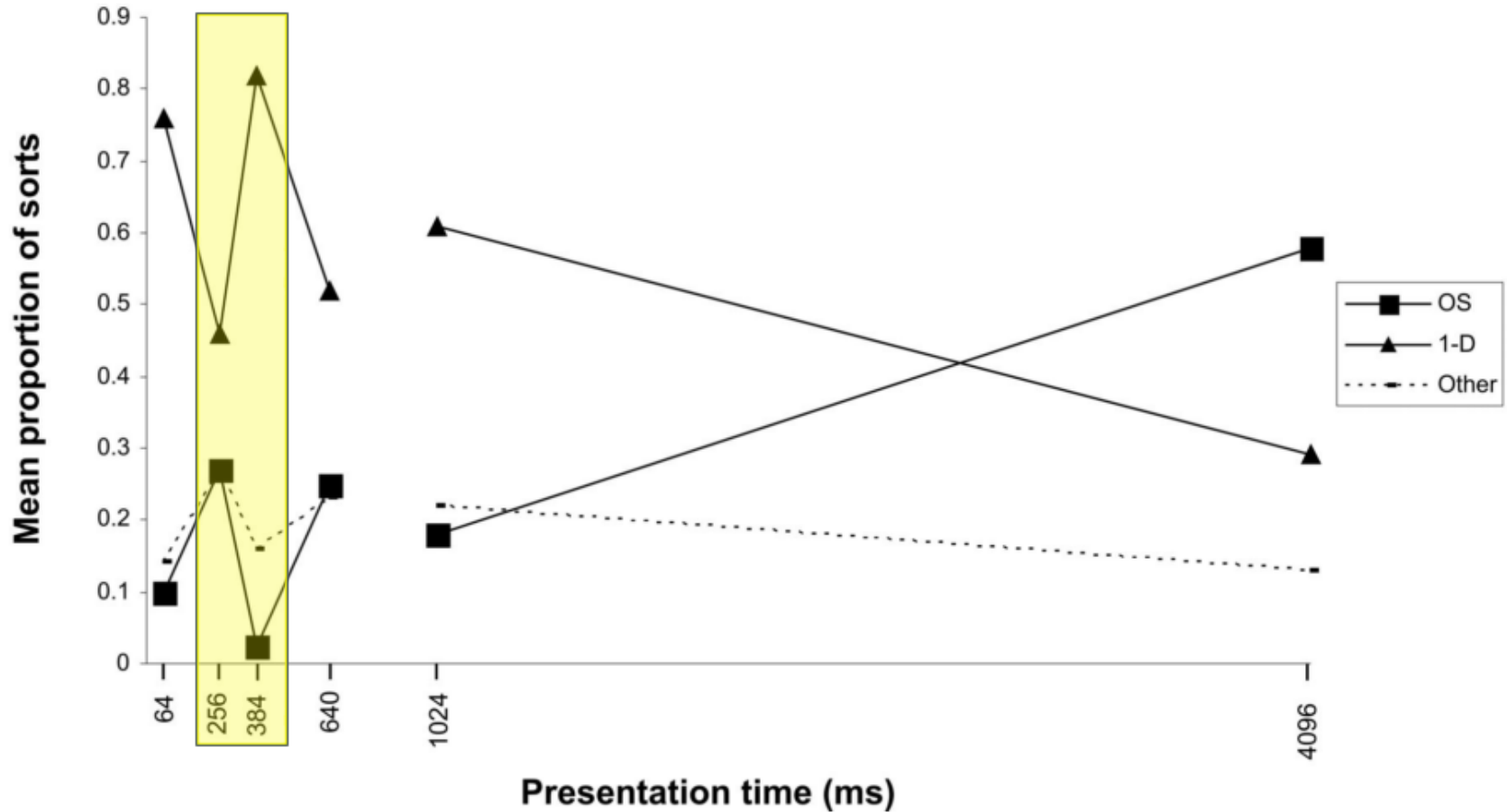
System 1

Associative
Holistic
Automatic
Light on cognitive resources
Fast

System 2

Rule-based
less ← **analytic** → more
Controlled
less ← **cognitive resources** → more
Slow

3. TITRATING TIME PRESSURE



COMMENTS, QUESTIONS?

Tinside Lido, Plymouth



Roland Levinsky Building
Plymouth University



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